

## NAVIGATION.

## STAGE OF WATER IN RIVERS.

The rivers continued low during September. In the Mississippi the highest stages were recorded from the 1st to 4th, at all points north of New Orleans, Louisiana; at that station it was highest on the 30th. The lowest stages occurred during the latter part of the month, except at New Orleans, where it was lowest on the 1st.

The Ohio river fell to one inch above low-water mark on the 16th, at Pittsburgh, Pennsylvania, and was very low throughout its course the entire month.

In the Missouri river the highest water was observed on the 1st and 2d, and the lowest at the end of the month.

At Nashville, Tennessee, the Cumberland river was closed to navigation on account of low-water during the whole month.

The highest and lowest stages of water observed at the Signal Service stations during September, 1883, are shown in the following table:

Heights of rivers above low-water mark, September, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
<i>Red River:</i>					
Shreveport, La.	29 9				
<i>Arkansas:</i>					
Little Rock, Ark.*	30 0	27, 28	4 8	11	2 8
Fort Smith, Ark.		18	3 0	23	1 2
<i>Missouri:</i>					
Yankton, Dakota	20 0	1, 2	2 2	29, 30	1 0
Omaha, Neb.	15 0		2 7	29, 30	5 1
Leavenworth, Kans.	21 0	1	8 11	21, 23, 24	6 4
<i>Mississippi:</i>					
Saint Paul, Minn.	14 6	4	2 3	15, 30	1 6
La Crosse, Wis.	18 0	1	1 11	20	1 0
Dubuque, Iowa	21 10	1	4 10	22	3 3
Davenport, Iowa	15 0	1	3 4	18, 23	2 0
Keokuk, Iowa	14 6	3	3 5	26, 27	2 2
Saint Louis, Mo.	30 0	1	11 0	28, 29, 30	7 0
Calto, Ill.	40 0	1	10 5	30	4 8
Memphis, Tenn.	34 0	1	8 2	30	2 4
Vicksburg, Miss.	41 0	1	13 8	30	3 5
New Orleans, La.†	—2 6	30	13 1	1	11 5
<i>Ohio:</i>					
Pittsburg, Pa.	20 0	1	1 9	16	0 1
Cincinnati, Ohio	50 0	30	5 9	20	3 7
Louisville, Ky.	24 0	1, 2, 3	4 3	24, 25	3 1
<i>Cumberland:</i>					
Nashville, Tenn.	42 0	1	1 6	18, 19, 20	0 5
<i>Tennessee:</i>					
Chattanooga, Tenn.	33 0	28	2 6	19	0 0
<i>Monongahela:</i>					
Pittsburg, Pa.	29 0	1	1 9	16	0 1
<i>Savannah:</i>					
Augusta, Ga.	30 0	27	5 8	16	3 10
<i>Willamette:</i>					
Portland, Oreg.		2	4 1	26	1 0
<i>Sacramento:</i>					
Red Bluff, Cal.		30	0 7	1	0 6
Sacramento, Cal.		2	6 9	28	6 6
<i>Mobile:</i>					
Mobile, Ala.		15	17 7	21, 24	15 4
<i>Colorado:</i>					
Yuma, Arizona		1	16 10	30	14 9

\* The zero of river gauge was raised nine inches on the 22d, and readings corrected to same level for entire month. † Below high-water marks of 1874 and 1883. ‡ No observations on 6th and 7th. Gauge broken.

## FLOODS.

Laredo, Texas.—The rain storm of the 4th and 5th was the heaviest that has been experienced here for a number of years. On the morning of the 5th about one-half of the city was covered with water. The walls of a large brick building erected for the Laredo water-works, were badly damaged. Trains from San Antonio and Corpus Christi were delayed on account of the washing away of bridges. The Rio Grande river rose seven feet in five hours on the 5th, and it continued to rise until noon of the 6th, when it had risen eighteen feet. Washouts occurred on the International and Texas-Mexican railways. Several houses on the Mexican side of the Rio Grande river were inundated on the 6th, and a large part of the Mexican National railroad bridge across the Rio Grande was washed away.

Reports from Corpus Christi on the 10th state that the recent rains caused all of the creeks west of that place, which had been dry during the entire summer, to rise to depths from

twenty to forty feet. Large numbers of horses, cattle, and sheep were swept away by the strong currents and were drowned. The Texas-Mexican railway lost eleven bridges and culverts, and several miles of railroad track between Corpus Christi and Laredo. On one section of the Texas-Mexican road, near Pena station, five bridges and one and one-half miles of the road-bed were washed away. At San Diego, Duval county, a bridge four hundred and fifty-six feet in length was washed away, and also another large bridge over the Salado river in Mexico. At Magaltaras station, on the Texas-Mexican railroad, about 1,100 sheep were drowned. On the 9th the Rio Grande had fallen to within a few feet of its former level.

## HIGH TIDES.

Portsmouth, North Carolina, 11th.—Very high tide; island submerged one foot. High tide also on the 9th and 10th.

Sloop Point, North Carolina, 8th to 11th, 13th, 19th, 20th.

Cape Lookout, North Carolina, 11th, 20th, 21st.

Cedar Keys, Florida, 18th.

Block Island, Rhode Island, 21st.

## VERIFICATIONS.

## INDICATIONS.

The detailed comparison of the tri-daily indications for September, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 87.61 per cent. The percentages for the four elements are: weather, 87.70; direction of the wind, 85.13; temperature, 87.43; barometer, 90.36 per cent. By geographical districts they are: For New England, 87.50; middle Atlantic states, 89.38; south Atlantic states, 85.89; eastern Gulf, 86.43; western Gulf, 88.59; lower lakes, 87.99; upper lakes, 84.55; Ohio valley and Tennessee, 92.10; upper Mississippi valley, 87.22; Missouri valley, 85.13; north Pacific, 86.54; middle Pacific, 93.97; south Pacific, 98.21.

There were one hundred and twenty-six omissions to predict out of 3,690, or 3.41 per cent. Of the 3,564 predictions that have been made, one hundred and six, or 2.79 per cent., are considered to have entirely failed; seventy-five, or 2.10 per cent. were one-fourth verified; four hundred and twenty, or 11.79 per cent. were one-half verified; two hundred and seventy-eight, or 7.80 per cent., were three-fourths verified; 2,685, or 75.34 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

## CAUTIONARY SIGNALS.

During September, 1883, one hundred and nineteen cautionary signals were displayed. Of these, ninety-six, or 80.7 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Eleven cautionary off-shore signals were displayed, of which five, or 45.5 per cent., were fully justified; nine, or 81.8 per cent., were justified as to velocity only; and two were not justified either as to direction or velocity. One hundred and thirty signals, of all kinds, were displayed, of which one hundred and one, or 77.7 per cent., were fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Seven signals were ordered late.

Eighty-three winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered. Many of these were high local winds or strong sea-breezes.

## TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during September, 1883, with average depth at which the observations were made, are given in the table below. The highest water temperature recorded during the month, 89° 1, occurred at Charleston, South Carolina; and the lowest, 47° 3, occurred at Alpena, Michigan. The largest monthly ranges are: Alpena, Michigan, 18° 4; Chincoteague, Virginia, 15°; Grand Haven, Michigan, 14° 5; Smithville, North Carolina, 13° 9; Fort Macon, North Carolina, 13° 5; Toledo, Ohio, 13° 4; Galveston, Texas, 13°. The smallest